

Mississippi State Department
of Health

State Trauma Plan



Bureau of Emergency Medical Services/Trauma System Development
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State Trauma Plan

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Executive Summary

The goal of the Mississippi Trauma Care System is to deliver the **right** patient to the **right** hospital the **first** time. Research shows that this approach decreases mortality. Trauma remains the leading cause of death for Mississippians age 1 to 44 and Mississippi ranks fourth in the nation for unintentional injury deaths.

A system of care needs to organize resources within the system in order to allow and optimize treatment of the patient in the shortest period of time. As such, a system would deliver the patient suffering from traumatic injuries to the nearest trauma center with resources capable of providing definitive care to the patient according to national standards of care. The system would then allow the patient to remain at the initial trauma center or facilitate transfer for higher level of trauma care if the initial facility does not have specialist services available. As a system, all care would be facilitated by hospital and EMS evidence-based treatment protocols; hospitals would be classified by their ability to treat and care for trauma patients; and performance improvement measures would be analyzed in both EMS and hospital care to improve and maintain standards of care.

The State of Mississippi began development of a state-wide trauma system in 1991. The Mississippi Legislature charged the Mississippi State Department of Health with the responsibility for oversight of trauma system development. Since that time, the State Board of Health has adopted a trauma system-of-care plan, established seven trauma care regions, designated qualifying hospitals as trauma centers, maintained a state-wide trauma registry, and distributed funding to trauma regions, trauma centers, physicians, and EMS providers.

Introduction to the Clinical Problem

Trauma is the fourth leading cause of death in the United States, resulting in approximately 170,000 deaths annually, or about 400 deaths per day. It is also the leading cause of significant disability. About half of deaths due to trauma are in people aged 15–45 years, and in this age it is the leading cause of death. Injury affects males much more than females, with 68% of all injuries occurring in males, and death is twice as common in males as it is in females. Furthermore, teens and young adults are more likely to need to be hospitalized from injuries sustained than are other populations. While elderly persons are less likely to be injured, they are more likely to die from injuries they have sustained.

People with trauma require specialized care, including resuscitation and surgery. Successful outcomes are achieved if this care occurs as quickly as possible during the “golden hour” of trauma. Hospitals with designated trauma centers have improved outcomes when compared to hospitals without them, and if persons who have experienced trauma are transferred directly to a trauma center, it can improve the outcome.

The cost of trauma measures both the amount of money spent, and the loss of potential economic gain, such as missing work days. The average economic cost for the treatment of traumatic injury in the United States is around \$334,000 per person, making it costlier than the treatment of cancer and cardiovascular diseases. One reason of the high cost of injury is the increased possibility of complications, which leads to the need for more interventions. Costs to maintain a trauma center are substantial as they must be open continuously and be prepared to accept the seriously injured patient. In 2009, approximately \$693.5 billion was lost due to traumatic injury in the United States.

The Mississippi Legislature passed House Bill 1405 during the 2007 Regular Session to revitalize, as well as increase funding to, the Mississippi Trauma Care System. Mississippi moved from a voluntary system with indigent reimbursement to a mandatory system with block grant funding based on participation, the first trauma system of its type in the United States. Mississippi is one of only eight states in the country that provides significant financial support to their respective state trauma systems.

Objectives

The Mississippi Trauma Care System will enhance community health through an organized system of injury prevention, acute care, and rehabilitation that is fully integrated with the public health system in a community. The system will possess the ability to identify risk factors and related interventions, to prevent injuries in a community, and will maximize the delivery of appropriate resources for patients who need acute trauma care. The trauma care system will address the daily demands of trauma and form the basis for disaster preparedness. The resources required for each component of the trauma care system will be clearly identified, deployed, and assessed to ensure that all patients have access to the appropriate level of care in a coordinated and cost-effective manner. System objectives for the next three-year plan cycle include:

- Participation in the trauma system, at the appropriate level, by all Mississippi-licensed acute care hospitals.
- Ensure traumatically injured patients are transported to the most appropriate hospital.
- Develop and deploy public awareness of the Mississippi Trauma Care System.
- Ensure coordination of effort and resources with other developing systems-of-care.

System Components and Organization

The Trauma Care System is comprised of a number of separate components which are organized and work together as a system. The individual components and elements are described below:

- Pre-Hospital Component – EMS is a critical part of the trauma system. All EMTs and Paramedics should have a basic knowledge and awareness of the system elements and system function. Specifically, this knowledge refers to injury criteria (Alpha/Bravo), triage and destination guidelines, and communication procedures. On-line and off-line medical control physicians will also need to be aware of the system elements and system function.
- Hospital Component:
 - Participation in the Mississippi Trauma Care System is required by statute and regulation. Hospitals must participate at their assessed capability (conducted annually) or must pay a non-participation fee. This process is known by the phrase: “Play or Pay.”
 - The decision to participate in the trauma system must be made jointly by the hospital administration and medical staff. A written commitment in the form of a resolution passed by the appropriate quorum of the governing authority of the hospital, and co-signed by the director of the medical staff, signifies the facility’s desire to participate in the system.
 - The Mississippi State Department of Health, through the Bureau of Emergency Medical Services/Trauma System Development, designates participating hospitals at one of four levels.
 - Level I Trauma Centers are comprehensive facilities, capable of treating the entire range of traumatic injuries.
 - Level II Trauma Centers have generally the same clinical services as a Level I facility, but lack the surgical residency and research capability.
 - Level III Trauma Centers can resuscitate and treat the majority of trauma injuries, but lack dedicated neurosurgical services.
 - Level IV Trauma Centers are stabilization and transfer facilities.
 - Refer to Appendix A for a detailed listing of clinical requirements.

- Every hospital designated as an adult Trauma Center is concurrently designated as a Primary Pediatric Trauma Center. Level II or III Trauma Centers may apply for designation as Secondary Pediatric Trauma Center. Level I Trauma Centers and dedicated pediatric hospitals may apply to be a Tertiary Pediatric Trauma Center.
- Region Component:
 - The concept of an inclusive trauma care system supports the regionalization of trauma care, each region having unique demographics and resources. The state has been divided into seven (7) Trauma Care Regions. Refer to Appendix B for a map of the regions.
 - Each region establishes a Board of Directors that acts as the administrative body of that region. Region administration is accomplished by the development of a regional trauma care plan. Once approved and included in the state Trauma System of Care Plan, the regional trauma plans are binding on all EMS providers and designated Trauma Centers within the respective region.
 - The Department executes a yearly contract with each Trauma Care Region. Through this contract, the regions execute the administration of the region, including: disbursement of Trauma Care Trust Fund distributions to Trauma Centers and EMS providers; assisting Trauma Centers with initial and renewal applications; and the regional Performance Improvement process.
- Communication Component – Communications are critical to the function of the Trauma Care System. Communications provide: 1) essential knowledge of the overall status of pre-hospital activities and hospital resource availability on a continual basis; 2) access to system organization and function protocols whenever such information is requested by pre-hospital or hospital-based personnel; and 3) collection of uniform system-wide data for PI activities and development of a state-wide trauma registry.
- Performance Improvement (PI) Component – This component is essential to the Trauma Care System to document continuing function and allows the implementation of improvements in a system where patients may not have the ability to make their own personal care choices, and depend on the system for appropriateness of care. The efficacy of the initial care in trauma patients plays a pivotal role in determining their outcomes. Therefore, there is a requirement to evaluate the system on a continual basis to determine the effectiveness of trauma care and system performance.

- This component uses the state Trauma Registry Collector database, which provides a systematic review of trauma care from initial medical contact by EMS through rehabilitation services (Refer to Appendix E). By reviewing all levels of care and outcomes, the registry provides information for use in determining and developing treatment protocols, education programs, and provides information for potential research studies.
- The Performance Improvement (PI) process involves specific steps at each level of care within the system. System-wide evaluation will be the responsibility of the Trauma Sub-committee of the State PI Committee. In hospitals, a multi-disciplinary peer review process must occur and must include both medical care and Trauma Center function. Pre-hospital evaluation will normally be conducted by the EMS provider and the Trauma Region. Refer to Appendix C for additional information on the PI Program.
- Mississippi Trauma Advisory Committee (MTAC) – MTAC is a designated committee of the Emergency Medical Services Advisory Council (EMSAC), which is established by statute; each member is a gubernatorial appointment. This committee will have the responsibility for system guidance and governance, which will occur through regulatory development. Refer to Appendix D for additional information on MTAC.

System Function

General function of the system will follow the scenario of:

- Trauma event occurs; 9-1-1 is called.
- Field triage is conducted by EMS personnel, who determine if the patient meets system activation criteria based on established activation criteria and destination guidelines (refer to Appendix F). When a patient meets activation criteria, EMS priorities are early notification and transport to the most appropriate Trauma Center based on the patient's condition.
- In an ideal situation, if assistance with patient designation is needed, EMS will contact their Medical Control who will use a Trauma Center resource tracking tool (State Medical Asset Resource Tracking Tool [SMARTT] or similar program) along with patient location to determine the appropriate destination for the patient based on an established criteria.
- EMS will establish contact with the destination Trauma Center to give advanced notification.
- Patient is transported to the Trauma Center, which initiates their response protocol based on activation criteria.

- If the patient is transported by private vehicle to a Trauma Center, the patient will be rapidly triaged by the Emergency Room staff and initiated into the trauma activation response protocol.
- If a higher level of care is needed, the patient is transferred to a Level I or II Trauma Center, or other specialty facility, based on the patient's injury and capability of the receiving facility to definitively treat the condition.

System Operations

System operations refer to the activities that occur after it is determined that a patient meets system entry criteria and communications have been established within the system.

- Pre-hospital Activities
 - Pre-hospital care will be carried out in compliance with the Mississippi Model Protocols and the EMS provider's Medical Control Plan.
 - Trauma patients are best served by rapid transport to the most appropriate facility. Field time should be kept to a minimum; however, pre-hospital care should not be sacrificed for less time on scene.
- Hospital Operations
 - Trauma care requires adequate resources (equipment and facilities) and personnel with training and commitment to carry out rapid initial assessment, stabilization, and initial care.
 - Hospitals will be classified into one of four levels of care based on resources available as outlined in Appendix A.
 - Initial hospital destination will be determined by the closest available hospital appropriate to the patient's level of care (refer to Appendix F). Hospital status may be determined by using the SMARTT resource tracking tool. For simplicity, hospitals may be assigned status based on pre-determined levels of care.
 - In the event a patient or family member requests transport to a specific facility that does not meet system destination guidelines, EMS and/or Medical Control will make a reasonable effort to convince the patient/family member of the proper destination.
 - If the patient is unstable (inadequate spontaneous ventilations without a secured airway or in cardiac arrest), the patient should

be transported to the nearest hospital, regardless of trauma center level (a secured airway includes any airway device that allows adequate ventilation and oxygenation).

- Inter-facility transfers – In the event a trauma patient is received by a hospital without current capacity or appropriate resources for the patient, the patient should be transferred to a Level I or II Trauma Center. Any hospital designated as a Level I or II Trauma Center agrees to accept inter-facility transfers upon request by a transferring hospital regardless of the patient's race, sex, creed, or ability to pay.

Appendix A: Trauma Center Standards

Level I - Tertiary acute care facility.

- The following services must be available 24/7:
 - Fully equipped Emergency Department with emergency physician in-house. Physician and/or mid-level provider must be in the trauma resuscitation area upon patient arrival.
 - Trauma/General Surgery in-house.
 - Orthopedic Surgery on call. Must respond within 60 minutes of time notified to respond.
 - Neurosurgery on call. Must respond within 30 minutes of time notified to respond.
 - Anesthesia in-house.
 - Surgical suites staffed and available.
 - Intensive Care Unit with critical care physician in-house.
 - Respiratory therapy service in-house.
 - Radiologic and diagnostic imaging in-house.
 - Clinical laboratory services in-house.
- Additional requirements:
 - Complete rehabilitation services.
 - Surgical residency program in at least one of the following: Emergency Medicine, General Surgery, Orthopedic Surgery, or Neurosurgery.
 - Trauma research program.

Level II - Acute care facility with resources to provide sophisticated trauma care.

- The following services must be available 24/7:
 - Fully equipped Emergency Department with emergency physician in-house. Physician and/or mid-level provider must be in the trauma resuscitation area upon patient arrival.
 - Trauma/General Surgery on call. Must respond within 30 minutes of patient arrival or EMS notification, whichever is shorter.
 - Orthopedic Surgery on call. Must respond within 60 minutes of time notified to respond.
 - Neurosurgery on call. Must respond within 30 minutes of time notified to respond.
 - Anesthesia in-house.
 - Surgical suites available. Staff on call must respond within 30 minutes of time notified to respond.
 - Intensive Care Unit with critical care physician available.
 - Respiratory therapy service in-house.
 - Radiologic and diagnostic imaging in-house.
 - Clinical laboratory services in-house.

- Additional requirements:
 - Complete rehabilitation services.
 - Injury prevention and community outreach programs.

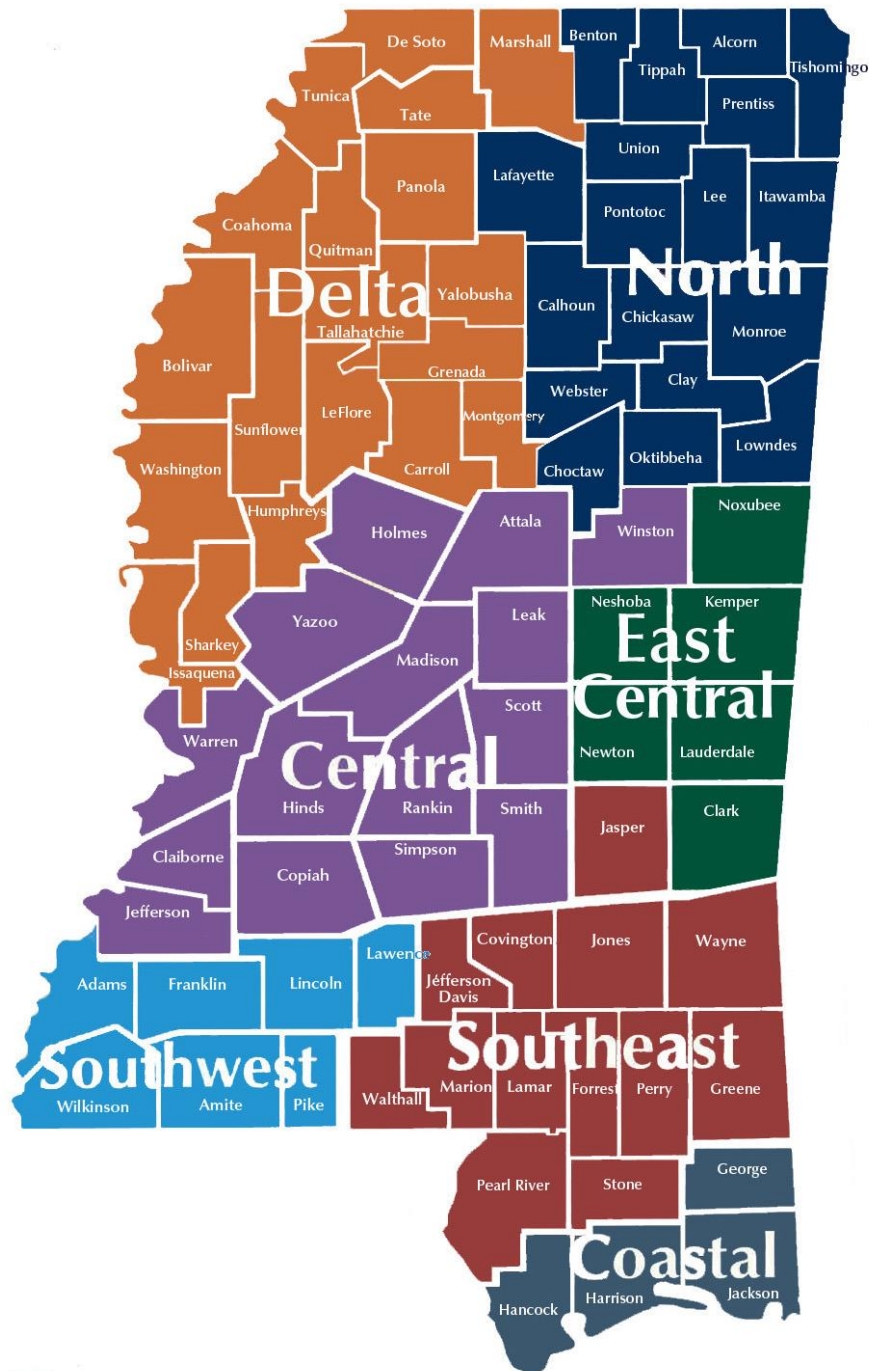
Level III - Acute care facility with resources to provide initial resuscitation of the trauma patient.

- The following services must be available 24/7:
 - Fully equipped Emergency Department with emergency physician in-house. Physician and/or mid-level provider must be in the trauma resuscitation area upon patient arrival.
 - Trauma/General Surgery on call. Must respond within 30 minutes of patient arrival or EMS notification, whichever is shorter.
 - Orthopedic Surgery on call. Must respond within 60 minutes of time notified to respond.
 - Anesthesia on call. Must respond within 30 minutes of time notified to respond.
 - Surgical suites available. Staff on call must respond within 30 minutes of time notified to respond.
 - Intensive Care Unit with physician in-house.
 - Respiratory therapy service in-house.
 - Radiologic and diagnostic imaging in-house.
 - Clinical laboratory services in-house.
- Additional requirements:
 - Rehabilitation services available.
 - Injury prevention and community outreach programs.

Level IV - Acute care facility with limited resources to stabilize and transfer the trauma patient.

- Emergency Department with emergency physician or mid-level provider in-house 24/7. Physician and/or mid-level provider must be in the trauma resuscitation area upon patient arrival.
- Transfer guidelines to ensure the most expedient, safe transfer of the patient.
- May be bypassed in accordance with this plan or Destination Guidelines (Appendix E).

Appendix B – Trauma Regions Map



Appendix C: Performance Improvement (PI)

Performance Improvement is a vital part of the Trauma Care System. It is used to document continuing proper function of the system and evaluation of that function to implement improvements in system operation and patient management. In a trauma system, patients have virtually no time or ability to make specific choices regarding medical care. Therefore, the system has a moral obligation to perform evaluation functions to assure that the highest level of care is being provided, and that improvements are implemented whenever possible in a timely manner.

The PI program will be system-wide. Each region, participating hospital, and EMS provider is required to participate in the PI process. The appropriateness, quality, and quantity of all activities of the Trauma Care System must be continuously evaluated.

- The Trauma Performance Improvement Sub-committee of the State PI Committee will be responsible for the PI oversight of the Trauma Care System.
 - The PI Sub-committee will be chaired by a trauma surgeon participating in the Trauma Care System.
 - Additional members shall include, but may not be limited to, representatives from the following areas:
 - Emergency Medicine
 - State EMS PI Committee
 - Trauma Registry Committee
 - One representative from each Trauma Care Region
 - Nursing representative from each Trauma Center level
 - Tertiary Pediatric Trauma Center
 - Trauma Medical Directors from each Level I Trauma Center
 - Specific system-wide audit filters/PI indicators will be established by the Sub-committee.
- Each Trauma Care Region will appoint a multi-disciplinary committee for the implementation of performance improvement activities in the region. The regional PI committee may wish to establish various sub-committees by specialty, i.e., EMS, clinical, or may choose to take on the task of system monitoring and evaluation at the committee level. Regardless of the configuration, the regional PI committee should include representation from each trauma center (physician and trauma program manager), EMS including 9-1-1 dispatch, non-trauma hospitals, county medical examiner/coroner, and air medical service (as appropriate). Membership should be established with specified terms of appointment and the chairman (a physician actively involved in the Trauma program), should be appointed.

- The regional trauma PI committee is responsible for analyzing region-specific trauma data to assess the effectiveness of the regional trauma system in reducing unnecessary death, disability, and cost.
 - In addition, the committee is responsible for addressing regional system issues or concerns and monitoring the availability and use of resources (hospital bypass or service diverts, air ambulance, inter-hospital transfers and transport).
 - Another key aspect of regional PI is the review of mortality cases to determine preventability rates, practice variation, and see improvement opportunities.
- Trauma centers at all levels are expected to develop a clearly defined PI program. The structure for trauma performance improvement can be organized in a number of ways depending on the hospital's level of designation, size of medical staff, availability of staff resources, and service volume. In most Level I-III trauma centers, PI review is performed by a multi-disciplinary trauma committee representing all phases of care provided to the injured patient, including pre-hospital and air medical. In a Level IV trauma facility, the PI committee may be comprised of emergency medicine or primary care physicians who staff the emergency department (ED), as well as the trauma nurse coordinator/manager, floor nurses, and EMS personnel.
 - Pre-hospital trauma performance improvement may occur under any number of venues and is inclusive of first response agencies, ground EMS, and aero-medical EMS. The first level of PI is at the local Licensed Ambulance Service, whose PI committee should be comprised of providers, management, and other pertinent personnel, as directed by the service's Off-Line Medical Director. The primary focus of this level of PI is to identify variations in clinical treatment and occurs primarily through the service's normal PI processes (e.g., retrospective chart audits).

In general, the following processes should be performed by each organization, at either the regional or local level. The results of these reviews will be reported to the PI Sub-committee.

- Each organization assigns a PI person to oversee the process,
- Determine audit filters,
- Collect data,
- Evaluate data,
- Determine system-of-care issues present,
- Develop corrective action plan (CAP),
- Re-evaluate to document results/effectiveness of CAP.

Specific items for evaluation:

- Pre-hospital:
 - Quality measures regarding response times (time to dispatch, EMS response, on-scene time, and total transport time)
 - Accuracy of patient assessment
 - Transport protocol adherence
 - Procedures initiated/completed
 - Medical control interaction
 - Transport mode (air/ground)
 - Record/documentation
 - Inter-facility care/transport safety
- Hospital:
 - Protocol adherence
 - Outcome review
 - Complications
 - Deaths
 - Achievement of time sensitive goals
- Regional system:
 - Communications/notifications
 - Triage
 - Protocol adherence

Appendix D: Mississippi Trauma Advisory Committee (MTAC)

The Mississippi Trauma Advisory Committee (MTAC) acts as the advisory body for the Trauma Care System and provides technical support to the Department in areas of system design, standards, data collection, system funding, and evaluation of the trauma care system.

MTAC is a committee of the Emergency Medical Services Advisory Council (EMSAC), whose members are appointed by the Governor for a term of four years:

- A physician nominated by the Mississippi Trauma Committee of the American College of Surgeons;
- An emergency physician nominated by the Mississippi State Medical Association;
- An emergency nurse nominated by the Mississippi Nurses Association;
- Two hospital administrators nominated by the Mississippi Hospital Association;
- Two operators of ambulance services;
- Three officials of county or municipal government;
- A physician nominated by the Mississippi Chapter of the American College of Emergency Physicians;
- A representative from each designated Trauma Care Region;
- A nurse nominated by the Mississippi Emergency Nurses Association;
- An Emergency Medical Technician-Paramedic;
- A representative of the Mississippi Department of Rehabilitation Services;
- A person who has been a recipient of trauma care in Mississippi, or who has an immediate family member who has been a recipient of trauma care in Mississippi;
- A neurosurgeon nominated by the Mississippi State Medical Association;
- A physician with trauma certification/experience nominated by the Mississippi Medical and Surgical Association;
- A representative from the Mississippi Firefighters Memorial Burn Association; and
- A representative from the Mississippians for Emergency Medical Services nominated by the association's governing body.

Mississippi Trauma Advisory Committee members are appointed by the Emergency Medical Services Advisory Council. The MTAC will meet quarterly or as required. Meetings of the MTAC may be independent or may be combined with other advisory committees, such as EMSAC.

Appendix E – State Trauma Registry

As a condition of hospital licensure, all acute care hospitals with an organized emergency service or department must submit trauma patient information to the State Trauma Registry.

There are four objectives of the Trauma Registry:

- Performance Improvement,
- Enhanced hospital operations,
- Injury prevention, and
- Supporting medical research.

If the registry is utilized appropriately, performance improvement can be done in a much more efficient manner than if done manually. Secondly, the registry can help in managing resource allocation and utilization through daily logs and summaries. Hospitals can use data from the registry to identify areas with the highest incidence of trauma and target those areas for injury prevention programs. Injury control issues can be identified at the local, regional, and state levels, thereby providing the basis for developing and implementing injury prevention programs statewide. Finally, standardization of the data allows quality data to be disseminated and used in clinical research and decision making.

The state registry system is designed primarily to collect data on only those patients with serious injuries. It is also designed to identify system issues, such as over and under triage, at the regional and state levels. In order to track these patients effectively, the Department has identified criteria for a patient to be included in the registry. Facilities must include, as a minimum, all patients that meet these criteria:

- All state designated patients must have a primary ICD-9 diagnosis code of 800-959.9, plus any one of the following:
 - Transferred between acute care facilities
 - Admitted to critical care unit (no minimum)
 - Hospitalized for three or more calendar days
 - Died after receiving any evaluation or treatment
 - Admitted directly from the Emergency Department to the operating room for a major procedure, excluding plastics or orthopedics procedures on patients that do not meet the three day hospitalization criteria
 - Triaged (per trauma destination guidelines) to a trauma center by pre-hospital care regardless of severity
 - Treated in the Emergency Department by the trauma team regardless of severity of injury

- The following primary ICD-9 diagnosis codes are excluded and should not be included in the trauma registry:
 - ICD-9 Code 905-909 (Late effects of injuries)
 - ICD-9 Code 930-939 (Foreign bodies)
 - Extremities and/or hip fractures from same height fall in patients over the age of 65.

Appendix F: Consolidated Trauma Activation Criteria and Destination Guidelines

